PROFITABILITY AND RESOURCE USE EFFICIENCY OF TOBACCO CULTIVATION IN SOME SELECTED AREAS OF LALMONIRHAT DISTRICT OF BANGLADESH

MAHMUDA KHATUN

DEPARTMENT OF AGRICULTURAL ECONOMICS

SHER-E-BANGLA AGRICULTURAL UNIVERSITY

SHER-E-BANGLA NAGAR, DHAKA -1207

JUNE, 2022

PROFITABILITY AND RESOURCE USE EFFICIENCY OF TOBACCO CULTIVATION IN SOME SELECTED AREAS OF LALMONIRHAT DISTRICT IN BANGLADESH

BY

MAHMUDA KHATUN

REGISTRATION NO.: 15-06864

A Thesis
Submitted to the Department of Agricultural Economics,
Sher-e-Bangla Agricultural University, Dhaka, in
partial fulfillment of the requirements
for the degree of

MASTER OF SCIENCE

IN

AGRICULTURAL ECONOMICS

SEMESTER: JANUARY-JUNE, 2022

Approved by:

Gazi MA. Jalil **Professor** **Dept. of Agricultural Economics** **Sher-e-Bangla Agricultural University** **Supervisor**	**Dr. Monoj Kumar Majumder** **Associate Professor** **Dept. of Agricultura Economics** **Sher-e-Bangla Agricultural University** **Co-supervisor**

DR. Monoj Kumar Majumder
Chairman
Examination Committee
Department of Agricultural Economics
Sher-e-Bangla Agricultural University

DEPARTMENT OF AGRICULTURAL ECONOMICS

SHER-E-BANGLA AGRICULTURAL UNIVERSITY

CERTIFICATE

This is to certify that thesis entitled, **"PROFITAILITY AND RESOURCE USE EFFICIENCY OF TOBACCO CULTIVATION IN SOME SELECTED AREAS OF LALMONIRHAT DISTRICT OF BANGLADESH"** submitted to the Department of Agricultural Economics, Sher- e-Bangla Agricultural University, Dhaka, in partial fulfillment of the requirements for the degree of **MASTER OF SCIENCE IN AGRICULTURAL ECONOMICS,** embodies the result of a piece of bona fide research work carried out **MAHMUDA KHATUN**, Registration No. **15-06864** under my supervision and guidance. No part of the thesis has been submitted for any other degree or diploma.

I further certify that such help or source of information, as has been availed of during the course of this investigation has duly been acknowledged.

Dated: June 2022

Place: Dhaka, Bangladesh

(Gazi MA. Jalil)
Professor
Dept. of Agricultural Economics
Sher-e-Bangla Agricultural University
Supervisor

Dedicated to

My Beloved Family

ACKNOWLEDGEMENT

Alhamdulillah, all praises are due to the almighty Allah for His gracious kindness and infinite mercy in all the endeavors which create that opportunity for the author to successfully complete the research work required for the partial fulfillment of the degree of Master of Science.

The author would like to express her heartfelt gratitude and sincere appreciations to her supervisor **Gazi M.A. Jalil, Professor,** Department of Aricultural Economics, Sher-e-Bangla Agricultural University, Dhaka, for his valuable guidance, advice, encouragement and support throughout the study. Likewise, grateful appreciation is conveyed to her Co-supervisor **Monoj Kumar Majumder, Associate Professor,** Department of Agricultural Economics, Sher-e-Bangla Agricultural University, Dhaka, for his constant encouragement, constructive criticisms, and valuable advice to complete the thesis.

The author would like to express her deepest respect and boundless gratitude to all the respected teachers of the **Department of Agricultural Economics**, Sher-e-Bangla Agricultural University, Dhaka, for their valuable teaching, sympathetic co-operation, and inspirations throughout the course of this study and research work.

The author is deeply indebted and grateful to her **Parents, siblings and nephew** who continuously prayed for her success and without their love, affection, inspiration and sacrifice this work would not have been completed. Lastly, the author wishes to extend her special thanks to **Nawshin Shahrin Toma** for his heartiest co-operation and encouragement throughout her research.

Mahmuda Khatun
June, 2022

TABLE OF CONTENTS

LIST OF TABLES

LIST OF FIGURES

ABBREVIATIONS AND ACRONYMS

BER= Bangladesh Economic Review
FY= Fiscal Year
GDP= Gross Domestic Product
BBS= Bangladesh Bureau of Statistics
etc= Etcetera
BARI= Bangladesh Agricultural Research Institute
BAT= British American Tobacco
FCV= Flue Cured Virginia
VIF= Variance Inflation Factor
OEC= The Observatory of Economic Complexity
DEA= Data Envelopment Analysis
MFC= Marginal Factor Cost
MPP= Marginal Physical Product
MVP= Marginal Value Product
MT=Metric Ton
CRS= Constant Return to Scale
VRS= Variable Return to Scale
BCR= Benefit Cost Ratio
et al.= and others (at elli)
GR= Gross Return
Kg= Kilogram
MOP= Muriate of Potash
TSP= Triple Super Phosphate
TC= Total Cost
TFC= Total Fixed Cost
TVC= Total Variable Cost
$= US Dollar
Tk= Taka
%= Percentage
IOC= Interest on Operating Capital

ABSTRACT

Bangladesh is predominantly an agricultural country. Tobacco is the narcotic crop. The purpose of the study was to describe the socio-economic characteristics of tobacco farmers in the study area; to measure the profitability and resource use efficiency of tobacco in selected areas and to identify problem faced by the farmers in tobacco production in the study area. Primary data were collected from randomly selected 61 farmers from two upazillas named Lalmonirhat sadar and Kaliganj of Lalmonirhat district. Both descriptive and econometric model were applied in this study. Total cost of tobacco production was Tk. 175601 per hectare. Gross return of tobacco was Tk. 209279 per hectare, gross margin of tobacco was Tk. 86340 per hectare and that of net return was Tk. 33677 per hectare. Benefit Cost Ratio (BCR) was found to be 1.19. Production function analysis suggested that, among the variables included in the model, cost of hired labor, cost of urea and cost of MOP had a positive and significant effect on the gross return of tobacco production. Resource use efficiency indicated that hired labor, seed, Urea, TSP and MOP were underutilized and irrigation and insecticide were overutilized by tobacco farmers. The study identified some problems and constraints faced by the tobacco farmers .Instituitional supports from government and Non-government organizations for credit, input and technology may be helpful to increase tobacco cultivation as well as income of tobacco farmers.

CHAPTER 1

INTRODUCTION

1.1. Background

Bangladesh has 171 million population but only 147,570 square kilometers of land (BER, 2022).The land is quite fertile, and the climate is favorable, so many different kinds of crops flourish here. Paddy, wheat,jute, tobacco, pulses,vegetables, oil seeds, spices, jack-fruit, banana, mango, coconut are the main crop of Bangladesh. Agriculture is the single largest producing sector of the economy and contributes about 13.02% FY 2019-2020 to the total Gross Domestic Product (GDP) of the country (BBS, 2022). According to the Labor Force Survey 2021-22, this sector also employs about 43% of the entire labor force. The performance of the agriculture sector heavily influences GDP growth rate of Bangladesh. Long-term economic growth and sustainable development have been assisted by the agriculture industry. However still, the development of this sector is intrinsically related to the growth of the economy. The functioning of this sector significantly affects important macroeconomic goals like job creation, poverty reduction, the development of human resources. Bangladesh is one of the top Tobacco-consiming nations in the world. Less than 0.5% of agricultural employment is related to the production of tobacco in Bangladesh (Barakat et al. 2012). In Bangladesh, tobacco production is a regular occurrence and has been practiced since the beginning of recorded history. During the mid-1960s of the previous century, tobacco has been introduced into the fields where food crops were produced, and it spread more widely after liberation in 1971 by the British American Tobacco Company in Teesta silt in Rangpur area (Sarkar and Haque, 2001). Although Bangladesh Agricultural Research Institute (BARI) conducted tobacco research and development initiatives, it stopped doing so in 1995.Tobacco is an unwholesome diet, and its raw materials are not acceptable for human health in any sector. The usage of tobacco products, including cigarettes, bidis, and other goods, can be damaging to one's health (Motaleb and Irfanullah, 2011). Nonetheless, compared to Bangladesh's total agricultural production, the cultivable acreage for drugs and narcotics (such as tea, tobacco, betelnuts, and betel leaves) is still only 1.02%. There are three varieties of tobacco in Bangladesh such as Tobacco Jati, Tobacco Matihari and Tobacco Vergenia. Considerably, there is only 24.52% (Tobacc Jati 4.88%, Tobacco Matihari 2.44% and Tobacco Verjinia 17.20%) land used for tobacco production among drug and narcotics in 2021 (BBS, 2022).

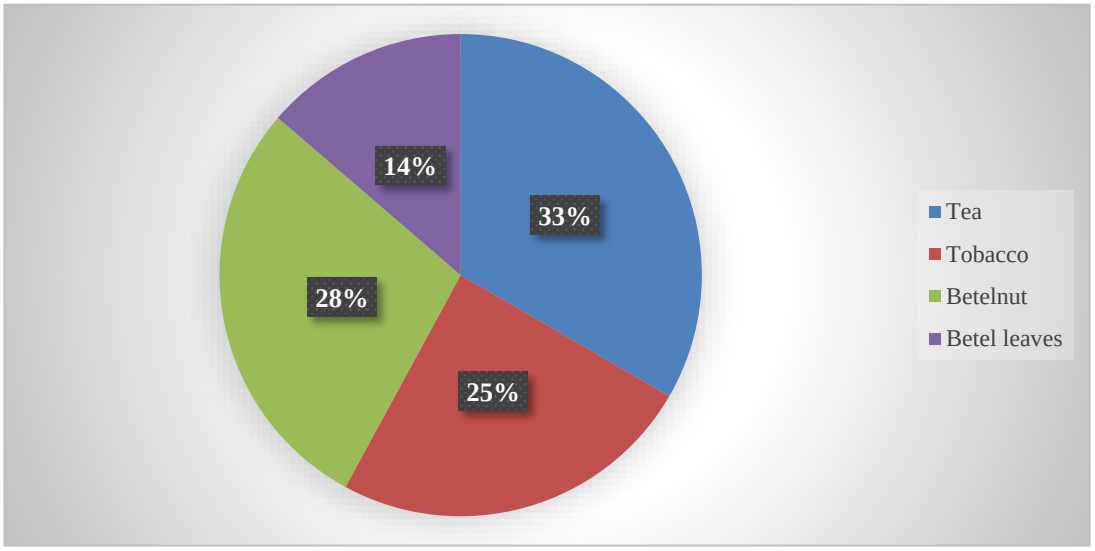

Figure 1.1. Area Cultivation of Drugs & Narcotics in Bangladesh, 2020-21

Source: BBS, 2022

While Virjinia is primarily grown in Kushtia, Rangpur, Jessore, and Dhaka, Jati and Motihari are primarily grown in Rangpur and Bandarban. Virginia is the most popular of the three types for companies, and almost all of the variety's production is exported. Biri, a popular local and inexpensive alternative to cigarettes, is mostly made from jati and motihar. During 2020–21, Khulna division will continue to have the most land covered by all three types of tobacco, with 44921.5 acres, followed by Rangpur division with 38195 acres, and Chattogram division with 10416.9 acres (BBS, 2022).

Table 1.1. Area and Production of Tobacco by Divisions of Bangladesh,2020-21

Division	Area (Acre)	Production (MT)
Barishal	0	0
Chattogram	10416.09	6543.13
Dhaka	5909.93	4812.21
Khulna	44921.05	47208.28
Mymensingh	69	52.34
Rajshahi	87.67	38.06
Rangpur	38195.05	30384.19
Sylhet	0	0

Source:BBS,2022

The flue-cured Virginia was first offered by the British American Tobacco (BAT) Corporation in 1967 on an experimental basis, and the following year, commercial production started. Up until 1971, 95% of the Flue Cured Virginia (FCV) consumed in this country had to be imported into Bangladesh. In the 2020–21 fiscal years, 68000 metric tons of Virginia type tobacco were produced, compared to 14000 metric tons of Jati variety and 7000 metric tons of Motihari variety (BBS, 2022).

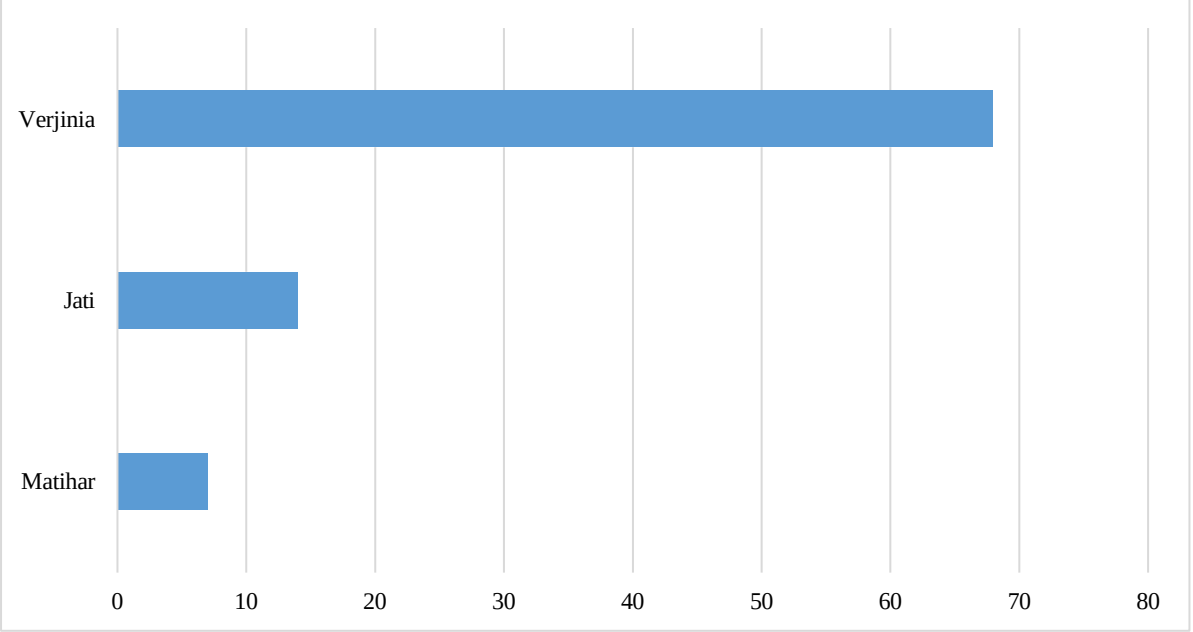

Figure 1.2. Production '000'MT of Three Varieties of Tobacco in Bangladesh During 2020-21

Source: BBS, 2022

1.2. Contribution of Tobacco in Bangladesh

Bangladesh is one of the biggest tobacco consumers in the world, the country's domestic industry accounts for a small portion of total tobacco leaf produced (considered to be about 1%). Domestic producers include the following: Akij Group, which produces Akij Biri and was acquired by Japan Tobacco Inc. in 2018; Abul Khair Leaf Tobacco, which manufactures lower-band Marise and Super Kings White; Alpha Tobacco Company, which produces brands like Boss, Brigage, Caesar, Purbani, Ranger, Senor Gold, and The President; Nasir Gold Company, which is known for its Nasir Gold and Nasir Biri brands;(BER, 2021).

In the 2000–01 fiscal year, Bangladesh produced a total of 37000 metric tons of tobacco in gross terms on 74000 acres of cultivable land. Currently, the area under cultivation for tobacco has risen by 105000 acres, and the production of tobacco is expected to reach 89000 metric tons in 2020–21. (BBS, 2022).

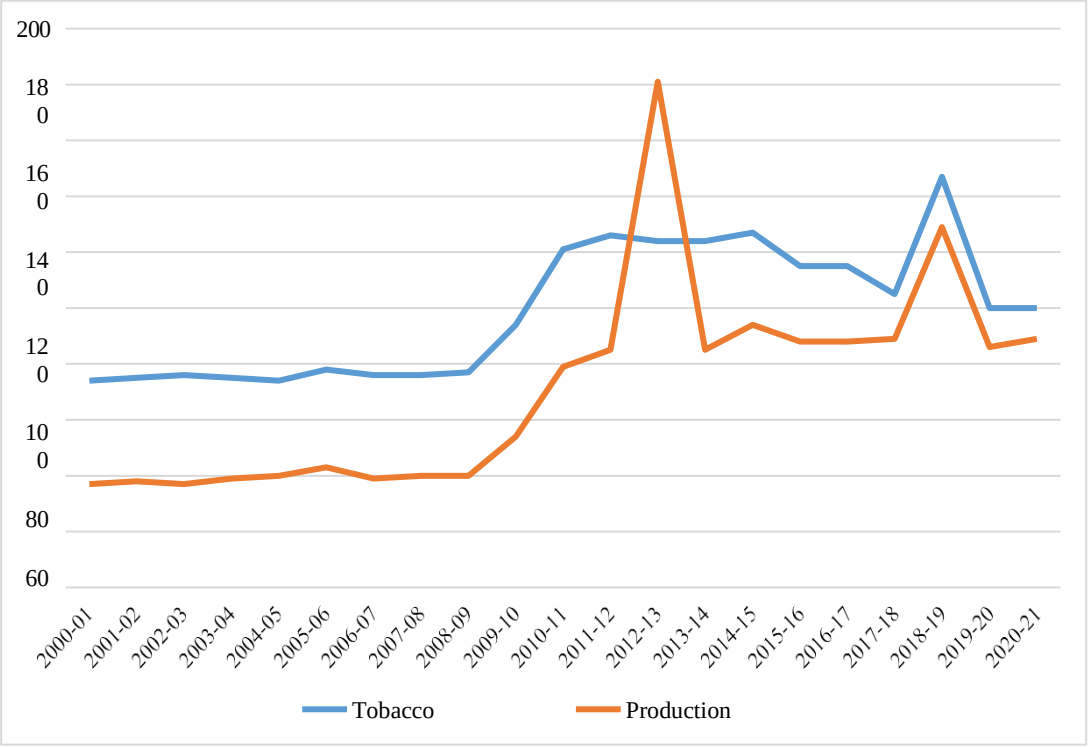

Figure 1.3 Area and Production of Tobacco in Bangladesh From 2000-01 to 2020- 21

Source: BBS, 2022

1.3. Justification of The Study

Tobacco is a single-cropped plant that typically grows from the middle of October to the middle of March. A large number of farmers engage in this practice every year, primarily because it is economical. In 2020, Bangladesh exported $3.69M in Processed Tobacco, making it the 59th largest exporter of Processed Tobacco in the world. At the same year, Processed Tobacco was the 149th most exported product in Bangladesh (OEC Report, 2021). On the other hand, Bangladesh imported $3.66M in Processed Tobacco, becoming the 108th largest importer of Processed Tobacco in the world. At the same year, Processed Tobacco was the 624th most imported product in Bangladesh (OEC Report, 2021). Bangladesh Government impose 65% exercise tax and increase the minimum price across all brands of processed tobacco during FY 2022-23. Despite tobacco being an important source of tax revenue, the government and anti-tobacco group continue to make efforts to reduce its consumption with the aim to eliminate tobacco from the country by 2040 (BER, 2022). Now-a-days, commercial tobacco cultivation is a issue of debate and so need research on it.

This study seeks to assess the present sociodemographic status of tobacco farmers, and the profitability of tobacco production .

1.4. Specific Objectives

a) To assess the present socio-demographic profile of tobacco farmers in the study area
b) To estimate the profitability of tobacco production in the study area
c) To measure the resource use efficiency of tobacco cultivation; and
d) To identify constraints of the study and suggest some policy guidelines for efficient tobacco cultivation.

1.4 Thesis Organization

This thesis contains a total of six chapters which have been organized in the following sequence.Chapter 1 includes introduction. Chapter 2 provides the review of literature. Chapter 3 provides methodology of the study. Chapter 4 provides the socio-demographic profile of the relevant study. Chapter 5 details the obstacles faced by tobacco producers. Chapter 6 contains the summary, conclusion and suggestion.

CHAPTER 2

REVIEW OF LITERATURE

2.1 Introduction

Reviewing several related research in relation to the current topic is the primary goal of this chapter. There haven't been many studies done about profitability and resource use efficiency of tobacco in Bangladesh. The purpose of the study was to align the profitability of tobacco farmers with their cost of production. The survey also found that large farmers were nearly profitable compared to others. The primary difficulties faced by tobacco growers included decreased tobacco prices throughout the harvesting season, price fluctuations, a lack of finance, a lack of high-quality seeds, inadequate storage facilities, greater input costs, a lack of marketing facilities, etc.

2.2 Review of Literature

Hossain and Rahman(2013), investigated socio-economic analysis on tobacco cultivation in Kushtia District of Bangladesh. The goal of the study was to identify some fundamental socioeconomic characteristics of tobacco farmers. This study examined the effects of tobacco farming on the environment and human health, as well as the causes of tobacco farming's financial success. The study found that while tobacco farming had some short-term beneficial effects, such higher profits, it also had some long-term detrimental repercussions on the environment and human health. The study also demonstrated that a wide range of variables, including the cost of seed, fertilizer, pesticides, irrigation, labor ,production, price, etc., affect earnings.

Hussain et al. (2020), conducted the economic cost of tobacco farming in Bangladesh. The study estimated the financial and economic profitability per acre of land used for tobacco cultivation. Based on a multi-stage stratified sample methodology with a mix of purposeful and random sampling of households, data were gathered through a household survey of current, past, and never tobacco growers.The environmental effects of tobacco cultivation on land and water resources were estimated using laboratory tests of sample water and soil collected from tobacco-cultivating and non- tobacco cultivating areas. The study discovered that tobacco growing became a losing activity

when the opportunity costs of unpaid family labor and other owned resources, as well as the negative consequences on health, were taken into account. The production of tobacco had a negative impact on society and a large environmental cost. Yet, the availability of unpaid family labor, the availability of advanced finance, the possibility of a buyback guarantee from the tobacco businesses, and other factors encourage farmers to begin and maintain tobacco growing.

Ullah *et al.* (2015) ,investigated economic profitability of production of tobacco in Swabi, KPK, Pakistan through the structured questionnaire and face to face interview method during 2013 from five purposively selected villages. 65 sampled respondents were investigated during the study. Farm budgeting technique was used to estimate cost, gross return and net revenue. Economic analysis revealed that the average cost was Rs. 348637.18 acre-1 with the average tobacco output estimate to be 3,244.73 kg acre-1 and average gross revenue of Rs. 430348.54 acre-1, whereas the average net revenue (net profit) was estimated to be Rs. 81711.36 acre-1.

Gumas(2008), evaluated economic analysis of oriental tobacco in Turkey. The objectives of the study included conducting an economic analysis of oriental tobacco, also known as "Turkish Tobacco," production under contract farming and offering oriental tobacco producers budgeting guidance for particular cost categories and an estimation of the net return on production in Turkey to assess tobacco production and price policy. The profitability was calculated by analyzing the cost, yield, and pricing data. Net profit from tobacco production was $0.49 per kilogram. Based on the study's findings, tobacco was a poor cash crop for growers. Many commercial producers diversify their sources of income, while the majority of small-scale growers only produce a modest amount of tobacco while also cultivating other crops (olive and grains) in an effort to reduce their dependence on tobacco.

Chirwa (2009) , explored the profitability of smallholder tobacco farmers in Malawi who interacted with a number of institutions offering various services to farmers including extension services, loan extension and tobacco marketing. This study investigated whether these institutions increased the profitability of tobacco farming for smallholder farmers. According to the findings, tobacco gross profits were not positively correlated with participation in farmer clubs or affiliation institutions. Alternatively, profitability was found to be positively correlated with productivity,

specialization, and the marketing of tobacco to intermediary buyers, while negatively correlated with distance to the market.

Faisal *et al.* (2018), conducted economic analysis and production efficiency of dark sun cured Rustica Tobacco production in Punjab, Pakistan. The objective of the study was to explore the technical, allocative and economic efficiencies and subsequently to estimate the determinants of inefficiency of tobacco farmers. Data were gathered from 210 farmers in the Punjab Province of Pakistan's two districts of Dera Ghazi Khan and Rajanpur. Using the data envelopment analysis (DEA) method, the technical, allocative, and economic efficiency were evaluated. The average technical, allocative, and economic efficiency scores of tobacco farms were 0.90, 0.82, and 0.75, respectively. The findings from the tobit regression analysis were high significant for each of the three efficiencies. Hence, let it be known that the household's age, level of education, ability to acquire loans for agriculture, and contact with extension staff all had a significant and negative impact on the inefficiency score.

Jaliwa Ntibiyoboka (2014), analyzed the economics of smallholder tobacco production and marketing in Mpanda, Tanzania. The objectives of this study were to determine the profitability of tobacco production and the influence of socio-economic factors, particularly farm size on tobacco profitability to farmers and the contribution of tobacco production to the household cash income. The profitability of tobacco cultivation was calculated using a gross margin. To ascertain the impact of changing farm size on profitability, a multiple linear regression model was used. Also, descriptive statistics were used to compare the amount of money that tobacco gave to other crops. Findings revealed that tobacco was the second-largest contributor after paddy, and that the size of the farm, the education level of the farmer, and the availability of extension services all had a significant impact on tobacco profitability.

Oren and Alemdar (2005), conducted the technical efficiencies of tobacco farms in Southeastern Anatolia.The empirical analysis employed parametric and nonparametric techniques to analyze data from 149 tobacco farms. The technological efficiencies were examined and compared using Data Envelopment Analysis (DEA) and Stochastic Frontier Analysis (SFA). According to the results of the DEA model, mean efficiency of tobacco farmers was found to be 0.45 and 0.56 for Constant and Variable Returns to Scale (CRS and VRS) assumptions, respectively. Mean technical efficiency obtained

with the SFA model was found to be 0.54. A strong correlation was found between the results obtained with output oriented VRS-DEA and SFA models. The study revealed that the tobacco farms would be able to increase their technical efficiency by 45% through better use of the available resources by applying current technology.

Nasrullah *et al.* (2019), focused on the cost and net return of tobacco farmers in Mardan, Pakistan. A carefully designed survey was utilized to gather information from 120 growers who were randomly selected for interview. The VIF analysis of the data revealed no issues with multi-collenearity. Analysis of the factors impacting production function revealed that, with the exception of farm size and production-related fertilizers, the results of the production regression were statistically significant overall.

The Pakistani tobacco producers' stochastic frontier output was examined by Saddozai et al. (2015).The main data was collected in 2014–15 from a sampling population of three villages in the Takhtbhai Tehsil, Mardan district, Khyber Pakhtunkhwa province: Takkar Kali, Garo Shah, and Passand Kali. The required sample size of 120 tobacco growers was obtained via a multi-stage sampling technique, and a parametric approach was used to examine into the technical efficiency of the farmers. The main results of the stochastic production frontier analysis showed that every variable was statistically significant and had a positive effect on the yield of tobacco, with the exception of fertilizer, which was significant but had an opposite impact. The estimated inefficiency of the model showed that only the experience of tobacco farmers in study area was significantly reducing their inefficiency.

Many researchers (Hasan et al. 2015; Ullah et al. 2015; Chirwa, 2009; Keyser, 2002, Nasrullah et al. 2018) focused to find out profitability of tobacco cultivation. Hossain and Rahman (2013) investigated socio-economic analysis on tobacco cultivation in Bangladesh. Another group of researchers (Hussain et al. 2020; Gumus, 2008; Faisal et al. 2018; Ntibiyoboka, 2014) conducted the economic cost of tobacco farming.

CHAPTER 3

METHODOLOGY

This chapter outlines the study's methodology. Methodology specifies how a certain outcome is to be calculated, how to identify the methodologies, and how to conduct research. In order to assess the profitability and resource usage efficiency analysis of tobacco farming, primary data were gathered from certain regions of Bangladesh. Below is an explanation of the study's approach in chronological order.

3.1. Study Area

First, taking into account the researcher's time, resources, and accessibility, the Lalmonirhat district of the Rangpur division was chosen purposively as the study area. The district of Lalmonirhat is located on Bangladesh's northern border.The district covers 481.613 square miles in total. It is located east of Kuriram and Kochbihar, west of Rangpur and the Nilphamari district, south of Rangpur, and north of Kochbihar and Jalpaiuri in West Bengal. This district's internment boundary is 281.6 kilometers long. There are 98,875 hectares of arable land in this district overall. Its population's primary source of income is agriculture. The population is made up of around 72.78% farmers, 10.49% company owners, 3.46% laborers, and 4.45% workers.Lalmonirhat district is consisted of five upazillas. The upazillas are Lalmonihat Sadar, Aditmari, Kaliganj, Hatibandha and Patgram. Secondly, Three upazillas namely Lalmonirhat Sadar, Aditmari and Kaliganj in Lalmonihat district were selected due to availability of tobacco cultivation farmers.

3.2. Sample Size and Sampling Technique

A method of multistage sampling was used. The following is a discussion of the specifics of the sampling technique:Lalmonirhat district was specifically selected for the initial stage due to the significant contribution of this district in national tobacco production. In the second step, the research chose two Upazilas in the Lalmonirhat District, and these Upazilas had a comparative advantage in locating small-scale tobacco growers. Lalmonirhat Sadar and Kaliganj are the names of these upazilas. From the list of tobacco growers residing in the two Upazilas under study, 61 individuals in all were selected at random sampling for the final stage which based on the availability of farmer which is 61 respondwnts for our study.The farmers were used flue -cured virginia variety for the study area. The sample of the study was 61 which was collected by field level survey from two upazila during November to December, 2022.

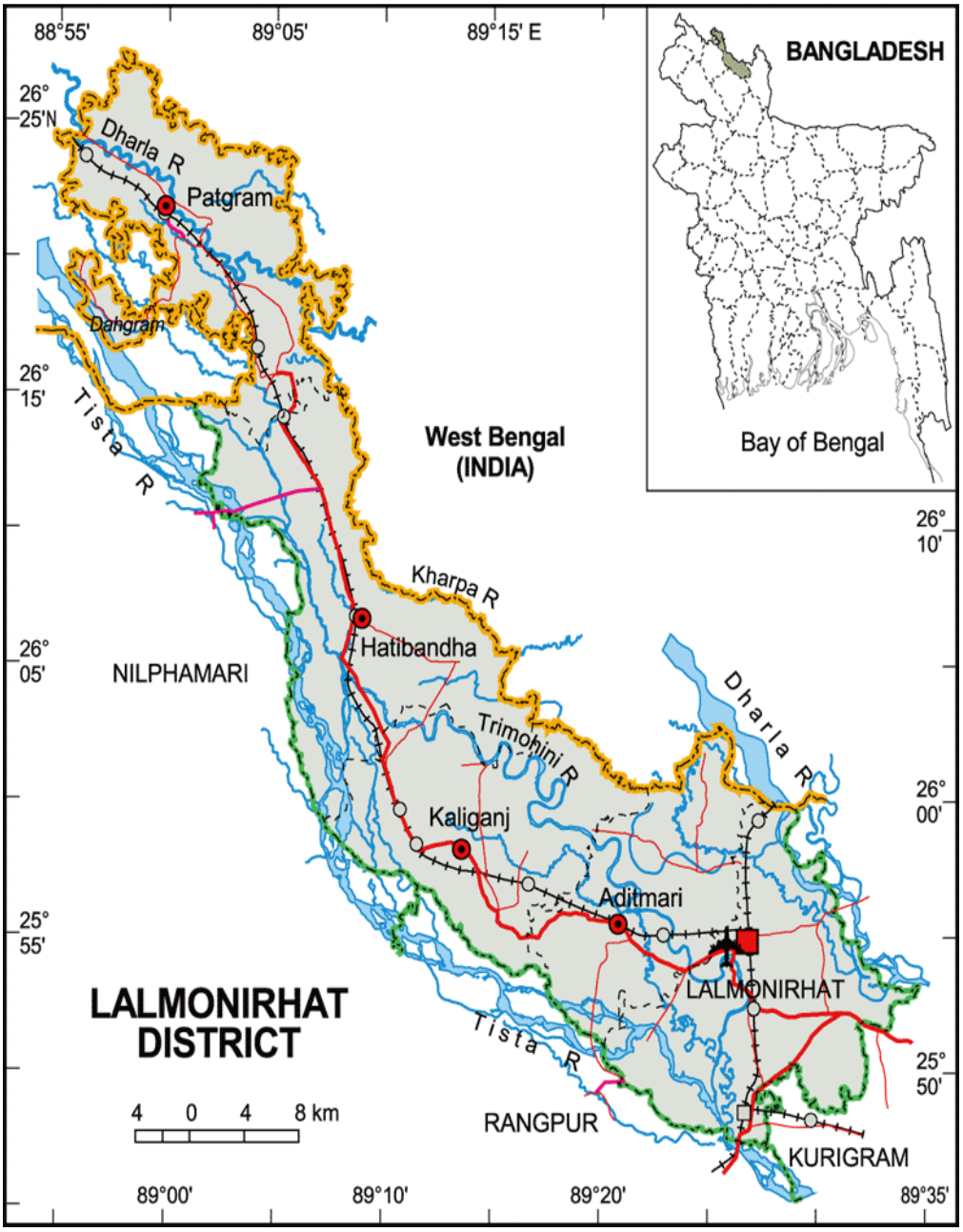

Figure 3.1. Map of Lalmonirhat District of Bangladesh

Source: Banglapedia

Table 3.1. Sample Distribution

SL No.	District	Upazilla	No. of Tobacco Cultivation Farmers
1	Lalmonirhat	Lalmonirhat Sadar	31
2		Kaligonj	30
Total			61

Source: Field Survey, 2022

3.4. Data Collection

A pre-structured and pre-tested interview schedule, in-person interviews was used to gather primary data for this study. Primary data were gathered about the demographic characteristics of the respondents, land ownership, farm size, cost of input use (human labor, machinery and materials), return from tobacco cultivation (product and by-product), tobacco farming experience, training on tobacco farming, access to extension service, technology adoption, household income, expenditure, access to microcredit, distance from home to local market, and membership of social oranization. The collected data entered into an Excel spreadsheet was imported into STATA for analysis.
Analytical Techniques

To achieve the goals of this study, data were examined using both econometric and descriptive models.

3.4.1. Analysis of Profitability

The real market prices that farmers received for their goods and paid for the inputs they had purchased throughout the research period were known as the financial prices. The following costs were determined for the study:

a. Hired labor
b. Machinery Input
c. Seed
d. TSP
e. Urea
f. MOP
g. Irrigation
h. Insecticide
i. Interest on operating capital

Profit = Total Returns – Total Costs

Based on the value of the primary items, the tobacco earnings were approximated. The study included descriptions of total cost, fixed cost, and variable cost. The items that made up the total variable cost (TVC) were labor from humans, machinery input, seed, urea, organic manure, TSP, MOP, pesticides and irrigation. Interest on capital was one of the fixed costs (FC) that land rental value and family labor. Both fixed and total variable costs were included in the total cost (TC).

3.4.1.1. Cost of Hired Labor

The expense of hired labor was regarded as main production-related cost elements. In general, it is necessary for a variety of tasks including clearing ground, planting and transplanting, weeding, applying pesticides and fertilizers, irrigation, cleaning, drying, storing, harvesting. In order to calculate human labor cost the recorded man-days per hectare were multiplied by the wage per man-day in a certain task.

3.4.1.2. Cost of Machinery Input

The machinery cost was considered to be one of the main important factors in the production process. Machinery cost for tobacco production included threshing, harvesting, ploughing, and laddering.

3.4.1.3. Cost of Seedling

Market prices of seedling of tobacco were used to compute cost of seed.To calculate the cost of seedling for the research locations, the market price of seedling was multiplied by the total amount of seed required per hectare.

3.4.1.4. Cost of Urea

The cost of urea was computed on the basis of market price. The stated unit of urea per hectare was multiplied by the market price of urea to determine the urea cost.

3.4.1.5. Cost of TSP

Market price was also included in the computation of TSP cost. In order to calculate cost of TSP the recorded unit of TSP per hectare were multiplied by the market price of TSP.

3.4.1.6. Cost of MOP

For a given activity, the cost of MOP per hectare was calculated by multiplying the market price of MOP by the unit cost per hectare of the input.

3.4.1.7. Cost of Irrigation

The control of water helps boost the output of tobacco. The expense of irrigation varies between farmers. The cost and frequency of irrigation were included in during computation.

3.4.1.8. Cost of Insecticide

To prevent illnesses and insects from damaging their crops, farmers apply two to three different kinds of pesticides. Based on the pesticides' market value per hectare utilized in the research locations, the cost of insecticides was computed.

3.4.1.9. Interest on Operating Capital

The opportunity cost concept served as the foundation for determining interest on operating capital.The operational capital really represented the average running cost over the course of the time, as not all costs were incurred all at once. Since the expenses were accrued throughout the course of the cultivation period, a six-month interest rate of ten percent annually on operational capital was calculated for tobacco.10% Interest rate is available in the market

The following formula was used to compute interest on operating capital:

IOC= AIit

Whereas

IOC= Interest on operating capital

i= Interest rate

AI= Total investment / 2

t = Total time period of a cycle

3.4.1.10. Calculation of Return

Gross Return

The gross return per hectare was calculated by multiplying the total product and by-product quantity by the corresponding unit prices.

Gross Return= (Quantity of the product X Average price of the product)+ Value of by-product

Gross Margin

To calculate gross margin, subtract variable expenses from gross return. Farmers often aim for the highest possible yield over the fluctuating costs of farming. Because farmers are more interested in receiving returns than variable costs, the gross margin analysis is justified. Based on the overall variable cost, the gross margin was

determined. By deducting variable expenses from gross return, gross margin was obtained per hectare.

Net Return

All cultivation costs were subtracted from the overall return, or gross return, to arrive at the net return or profit. Thus,

Net Return (NR) = Total return (TR) – Total cost (TC).

3.4.1.11. Benefit-Cost Ratio (BCR) Analysis

An indicator, either in monetary or qualitative terms, that illustrates the link between the relative costs and advantages of a proposed project is the benefit-cost ratio (BCR). The average return on each taka invested in agriculture, or BCR, is a crucial indicator of profitability. BCR was estimated as the ratio of total return to the total cost per hectare.

Thus,

BCR = Total return (Gross return)/ Total cost

BCR>1, the return from tobacco cultivation was economically satisfactory.

BCR<1, the return from tobacco cultivation was not economically adequate .

BCR=1, there exist economic breakeven point of tobacco cultivation.

3.4.2.Production Function Analysis

The production function represents the technical link between the input element and the output. One of the production functions that is most frequently used is the Cobb Douglas production function. This research was first used by C.W. Cobb and P.H. Douglas in their twenties to gauge worker finance and productivity in the American industrial sector. Their main objective was to merge employee equity and capital into a final product;as a result, they used compression to ensure that the coefficients of deterioration or elasticity were included. They later made the practice available.

This project's following features have contributed to its popularity:

i) It gives the production elasticities with regard to inputs directly;

ii) More degrees of freedom are possible with it than with other algebraic forms (such as the quadratic function), which permit changing marginal productivities. and

iii) As a result, there are fewer regressions to handle in the regression analysis, which streamlines the computation.

The first form used by Cobb and Douglas was

$$Q = aL^{\beta} K^{1-\beta}U$$

This forces the expansion amount to one. Afterwards,their later conversion was

$$Q = aL^{\alpha}K^{\beta}U$$

Where, **α+β** it does not have to be equal to one.

This operating system has not been used in agriculture in its original form. There is no restriction on the number of variables to one or to the same level of flexibility. Cobb and Douglas were given the fundamentals of the working form, but many kinds of labor have continued to be referred to as Cobb-Douglas production work even since then described as

$$Y_i=\beta_1 X_{2i}^{\beta 2} X_{3i}^{\beta 3} e^{ui} \ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots(3.1)$$

There, Y = output

X2 = labor input

X3 = capital input

u = the name of the stochastic disorder

e = the basis of the natural logarithm.

From Eq. (3.1) it is clear that the relationship between the output and that of both inputs is not linear. However, if we change this model, we get:

$$lnY_i = ln\beta_1 + \beta_2 lnX_{2i} + \beta_3 lnX_{3i} + u_i$$
$$= \beta o + \beta_2 lnX_{2i} + \beta_3 lnX_{3i} + u_i \ldots\ldots\ldots\ldots (3.2)$$

Where, β_0 = lnβ_1.

As written, the model is a vertical line model as it is linear in the parameters β_0, β_2 and β_3. But take note that this is a line in the logs of these variables, not a line in the Y and X variants. In summary, (3.2) is the opposite half of the multiple retrospective log two-line log model, also known as a log model, a double log, or a linear line.

The production function of Cobb-Douglas is widely recognized.

1. β_2 measures the percentage change in output, say a 1% change in employee inputs, retaining a fixed investment amount. It represents the (partial) expansion of output in respect to employee inputs.
2. In a similar vein,3 represents the partial extension of the output with respect to inputs, holding constant inputs for employees.
3. As the output of the output in a constrained input change, the total ($\sum\beta_i$) tells us something about the returns on the scale. There is a continuous return on the scale if this number is 1, meaning that an input of double will result in an output of double, an input of triple will result in a triple output, and so with. Two times the input will not equal twice the output if the amount is less than 1. This indicates a decline in the scale. In conclusion, a rising return is present on the scale if the quantity is larger than 1, meaning that twice the input will result in an output that is greater than twice the input.

Before continuing, keep in mind that the coefficient of each X variable in a log-regression model measuring the expansion (partial) of the Y-dependent variance with respect to that variance may be found for any number of variables. In the event that my flexible log-linear model is:

$$lnY_i = \beta_0 + \beta_2\ lnX_{2i} + \beta_3\ lnX_{3i} + \cdots..+\beta_k\ lnX_{ki} + u_i \ldots\ldots\ldots (3.3)$$

Each of the coefficients (partially) of the regression, β_2 to β_k, is the Y's extension (partially) with respect to the X_2 to X_k variable. According to Acharaya (1988), if model (3.2) satisfies the retrospective model's consideration, it is determined to be delayed by OLS.

3.4.1.12. Specification of the Cobb-Douglas Production Function

Tobacco cultivation's input-output connection was examined using the Cobb-Douglas production technique. The following model specifications were applied in order to ascertain the contribution of the most significant modifications in tobacco farming productivity.

$$Y= aX_1^{b1}X_2^{b2}X_3^{b3}X_4^{b4}X_5^{b5}X_6^{b6}e^{ui} \ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots(3.4)$$

The next logarithmic version of the Cobb-Douglas production function has been utilized in order to solve it in the usual small square (OLS) format.

Where, Y = Total annual Return (Tk / ha)

X_1 = Cost of hired labor (Tk./ha)

X_2 = Cost of seed (Tk / ha)

X_3 = Cost of Urea (Tk / ha)

X_4 = Cost of TSP (Tk / ha)

X_5 = Cost of MoP (Tk / ha)

X_6 = Cost of compost (Tk / ha)

X_7 = Cost of insecticide (Tk / ha)

X_8 = Cost of irrigation (Tk / ha)

a = Disconnect;

b1…… .b8 = Coefficient of corresponding fluctuations;

Ui = Error Time;

i = 1, 2, …… .8.

3.4.2.2 Measurement of Resource Use Efficiency

The ratio of the marginal value product (MVP) to the marginal factor cost (MFC) for each input was calculated and evaluated for equivalence with 1 in order to assess the efficiency. that is, MVP/MFC = 1.

The extra to gross returns in value terms generated by an additional unit of a resource is its marginal productivity, assuming all other inputs remain constant. The marginal physical product (MPP) is multiplied by the product's unit price to determine the MVP. By calculating the geometric mean of resources (Xi) and gross return (Y), the most precise and perhaps most pertinent estimate of MVP is obtained.

In this study the MPP and the corresponding values of MVP were obtained as follows:

$MPP_{Xi}*P_{Yi}$ = MFC,

Where, MPP_{Xi} *Pyi = MVP,

But, MPP = bi*(Y/X_i)

So, MVP = bi* (Y/X_i) P_{Yi}

Where,

b_i = Regression coefficient per resource

Y = Mean output

X_i = Mean value of inputs

P_{yi} = Price of output

MFC = Price per unit of input.

The following will be the criterion for determining efficiency:

➢ When the resource's MVP and MFC ratios equal one, it is being used efficiently.

➢ When the resource's MVP to MFC ratio is greater than unity, it suggests underutilization.

➢ When the ratio of MVP and MFC is less than unity , it suggests overused.

CHAPTER 4
RESULTS AND DISCUSSIONS

4.1. Socio-Demographic Profile of Tobacco Farmers

4.1.1. Age

An essential factor in characterizing the area's demographic composition is the age of the sample farmer. Farmers' ages have an impact on tobacco production as well. A real year was used in the calculation.

Table 4.1. Age Distribution of Sample Farmers

Age (Year)	Number	%
18-30	6	9.8
30-40	11	18.00
40-50	21	34.40
50-60	21	34.40
Above 60	2	3.3
Total	61	100

Source: Field Survey, 2022

Table 4.1 showed the tobacco farmers in the research region were arranged according to age . It is clear from the table that most farmers were middle-aged in the study area.Of these sample farmers 9.8% were between the ages of 18-30, 18% of the respondents were between the ages of 30-40 years, 34.4% of the respondents were between the ages of 40-50 years, 34.4% of the respondents were between 50-60 years, and above 60 years (3.3%).

4.1.2. Educational Level

A country's foundation and the fundamental source of all forms of success is its educational system. Education contributes to social and economic advancement and is useful in and of itself. Agriculture development also depends on education. Through education, one may keep abreast of new protocols and technical developments in a variety of industrial operations. It enhances one's capacity to optimize profit by managing limited resources effectively. It also helps someone make the greatest choice they can.

There were five groups based on the educational backgrounds of tobacco producers.

i) Illiterate
ii) Primary
iii) Secondary (6-10)
iv) Higher Secondary
v) Higher Study

Table 4.2. Educational Level of Sample Farmers

Level of Education	Number	%
Illiterate	15	24.6
Primary	12	19.7
Secondary (6-10)	20	32.8
Higher Secondary	8	13.1
Higher Education	6	9.8
Total	61	100

Source: Field Survey, 2022

The study background of the selected tobacco producers was displayed in Table 4.2. The percentages of illiterate, primary, Higher Secondary, and higher education levels were 24.6%, 19.7%, 13.1%, and 9.8%, respectively, whereas the majority of farmers (32.8%) had only completed their secondary school.

4.1.3. Main occupational status

Farmers in this research region were engaged in a variety of tasks, including the production of tobacco. It was observed that tobacco growers' primary occupation and main source of revenue was tobacco production. A few of them had the chance to take part in additional events. The data makes it evident that 48% of farmers farmed crops, 5% worked as day laborers or provided support services, and 3% were in the business sector (Table 4.3).

Table 4.3. Main Occupational Status of Sample Farmers

Main Occupation	Farmers	
	Number	%
Agriculture(Crop Farming)	48	78.7%
Non -Agricultural		
Day Labour	5	8.2%
Service	5	8.2%
Business	3	4.9%
Total	61	100%

Source: Field Survey, 2022

4.1.4. Family size

Family size scores of the farmers ranged from 2to 12.Average family size is 5.2. According to family size,the respondents were classified into three categories as small family (2-3 members), medium family (5-6 members) and large family (above 6 members) .Out of 61 sample farmers 37.58 % belonged to the small family of 2-3 members, 42.33% belonged to the medium family of 5-6 members and 20.09% belonged to the large family size of above 6 persons (BBS, 2022).

Table 4.4:Family Size of the Tobacco Farmers

No. of family Members	No. of farm Family	Percent(%)	Average Family Size
Small Family(2-3)	22	36.06%	5.2
Medium Family(5-6)	29	47.54%	
Large Family(>6)	10	16.04%	
Total	61	100	

Source:Field Survey, 2022

4.1.5. Annual Income

Annual household income of the sample farmers from different sectors such as crops,

livestock,fisheries, business etc is considered as family income.Findings of the study that average monthly household income of the respondents (Tk.19,283) is well above the national average of the TK.15,998 (HIES,2020).

Table 4.5: Distribution of the Farmers According to Their Annual Income

Income group(Lakh tk.)	**Farmers**	
	Number	**Percent(%)**
Low income(<2)	48	78.69%
Medium income(2-3)	8	13.11%
High income(>3)	5	8.20%
All income group	61	100

Source:Field survey,2022

Result shows that out of 61 sample farmers were categoried into three groups as low,medium and high where 78.69% fell into low income group,13.11% fell into medium income and 8.20% fell into high income group.Majority of the farmers belongs to low income group.

4.1.6. Farm Size

Farmers holdings were categorized into five categories which are as follows(DAE,2022)

i) Landless (<0.02)
ii) Marginal (0.021-0.20)
iii) Small (0.21-1)
iv) Medium (1.01-3)
v) Large (> 3)

Table 4.6. Distribution of Farmers Based on Farm Size of Sample Farmers

Farm Size (Ha)	Farmers	
	Number	**%**
Landless (< 0.02)	0	0.00%
Marginal (0.02-0.2)	9	14.75%
Small (0.21-1)	50	81.97%
Medium (1.01-3)	2	3.28%
Large (> 3)	0	0.00%
Total	61	100%

Source: Field Survey, 2022

Table 4.6 depicts that of the 61 sample farmers, 81.97% farmers were small category, 14.75% farmers were marginal and 3.28% were in medium category. There was no sample farmer in landless and large category.

4.1.7. Membership on Organization

Table 4.7 depicts the sample farmers' distribution based on their affiliation with various organizations.Among total 60 tobacco farmers, 55.7% farmers were engaged in organization through membership while remaining (44.3%) were not involved in organization.

Table 4.7. Membership on Organizations of Sample Farmers

Membership on Organization	Farmers	
	Numbers	**%**
No	27	44.3%
Yes	34	55.7%
Total	61	100%

Source: Field Survey, 2022

4.1.8. Distance From Market

The respondents' distances ranged from 0.25 to more than 2 kilometers from the market. Table 4.8 illustrates the three groups into which the sample tobacco farmers were divided based on their distance from the market: short, medium, and long distance.

Table 4.8. Distribution of The Farmers According to The Market Distance

Distance (km)	Farmers	
	Number	%
Short distance (0.25-1)	5	8.2%
Medium distance (1.01-2)	14	23.0%
Long distance (above 2)	42	68.8%
Total	61	100%

Source: Field Survey, 2022

Based on Table 4.8, it was observed that the largest percentage of farmers, 68.8%, were located distant from the market, compared to 23% who were located medium distance away and 8.2% who were located close to the market.

4.2. Financial Profitability of Tobacco Cultivation

4.2.1. Variable Costs

4.2.1.1. Cost of Hired Labor

The cost of labor is one of the primary expenditures associated with agriculture. Among the most important and often used inputs in the manufacturing of tobacco is this one. It is frequently required for a range of activities, like clearing the ground, planting, weeding, applying fertilizer and pesticides, irrigating, harvesting and transporting, cleaning, drying, and storage, among others. It was discovered that the average cost of human labor in the tobacco industry was Tk. 500 per man-day, and the amount of labor employed per hectare was around 88 man-days. Consequently, it was found that the entire cost of labor was Tk. 44000.00 per hectare or 25.06% of the overall cost. (Table 4.9)

4.2.1.2. Cost of Machinery Inputs

Machinery was used for land used preparation and primarily for laddering and transplanyting.The total cost of machinery was Tk 2718.41 per hectare representing 1.55% of the total cost(4.9).

4.2.1.3. Cost of Land Preparation

Table 4.7 shows on an average the cost of land preparation of tobacco production was Tk. 15624.47 per hectare , or 8.90% of the total cost.(Table 4.9)

4.2.1.4. Cost of Weeding

On an average the cost of weeding of tobacco production was Tk. 4947.82 per hectare, which representing 2.82% of the total cost (Table 4.9).

4.2.1.5.Cost of Compost

The average cost of compost was Tk 8973.09 per hectare which representing 5.11% of the total cost(Table 4.9)

4.2.1.6.Cost of Seedlings

The quality and availability of seedlings determined a large range in price. The total cost of seedling was Tk 14618.01 per hectare, or 8.32% of the total cost (Table 4.9).

4.2.1.7.Cost of Urea

Farmers used 281.68 kg of urea per acre on average. According to Table 4.7, the average cost of urea was Tk 7042.06 per hectare, or 4.01% of the overall cost.(Table 4.9)

4.2.1.8.Cost of TSP

Farmers applied 384.87 kg of TSP per acre on average. Tk. 9621.76 per hectare, or 5.48% of the overall cost, was determined to represent the entire cost of TSP (Table 4.9).

4.2.1.9.Cost of MOP

Farmers used 145.83 kg of MOP per acre on average. MOP was found to have cost Tk 3062.51per hectare in total, or 1.74% of the overall cost (Table 4.9).

4.2.1.10.Cost of Zinc

Farmers utilized 4.89 kg of zinc per acre on average. Zinc was found to have cost Tk 684.67 per hectare in total, or 0.39% of the overall cost (Table 4.9).

4.2.1.11. Cost of Irrigation

One of the biggest expenses associated with growing tobacco is irrigation. Irrigation is essential to tobacco cultivation. Right doses application of irrigation water help to increase the number of leaves and plant height. The yield per hectare is rising as a result. It was found that the average cost of irrigation was Tk 10136.98 per hectare, or 5.77% of the total cost (Table 4.9).

Table 4.9. Per Hectare Cost of Tobacco Production

Items	Qty	Price (Tk)	Tk/ha	% of total Cost
Variable Cost				
Land preparation cost			15624.47	8.90
Machinery cost			2718.41	1.55
Weeding cost			4947.82	2.82
Hired labor (man-days)	88	500	44000.00	25.06
Compost (Kg)	5982.06	1.5	8973.09	5.11
Seedlings (Kg)	208.83	70	14618.01	8.32
Urea (Kg)	281.68	25	7042.06	4.01
TSP (Kg)	384.87	25	9621.76	5.48
MoP (Kg)	145.83	21	3062.51	1.74
Zinc (Kg)	4.89	140	684.67	0.39
Irrigation cost			10136.98	5.77
Insecticide cost			1509.30	0.86
Total variable cost			122939.08	70.01
Fixed cost				
Family labor (Man-days)	52	500	26000.00	14.81
Interest on operating capital (IOC)			4819.30	2.74
Rental value of land			21843.51	12.44
Total fixed cost			52662.81	29.99
Total cost			175601.89	100.00

Source: Field Survey, 2022

4.2.1.12.Cost of Insecticides

To keep pests and illnesses away from their crops, farmers employed a variety of pesticides. It was discovered that the average cost of pesticides for tobacco growing was Tk. 1509.30 per hectare, or 0.86% of the overall cost. (Table 4.9).

4.2.1.13.Total Variable Cost

According to Table 4.7, the overall variable cost of tobacco production was Tk. 122939.08 per hectare, or 70.01% of the total cost of production.

4.2.2. Fixed Costs

4.2.2.1. Interest on Operating Capital

It should be noted that all operating costs spent throughout the duration of tobacco production were taken into account when calculating the interest on operating capital. An estimate of Tk 4819.30 per hectare was made for the interest on operating capital for tobacco production.

4.2.2.2. Rental Value of Land

The rental value of the land was calculated using the opportunity cost of using each hectare of land for six months of cultivation. Based on information obtained from tobacco growers, the land usage cost was calculated to be Tk 21843.51 per hectare, or 12.44% of the total cost of production (Table 4.9).

4.2.2.3. Family Labor

Family labor was found to be engaged in tobacco production at a rate of around 52 man-days per hectare, with an average cost of family labor was Tk 500 per man-day. Thus the total cost of family labor was found to be Tk 26000.00 or 14.81% of the overall cost (Table 4.9)

4.2.2.4.Total Fixed Costs

Therefore,from the above different costs items it was clear that the total fixed cost of tobacco production was Tk 52662.81 per hectare, or 29.99% of the total cost of production.(Table 4.9).

4.2.2.5.Total Cost

All of the fixed and variable costs were added up to determine the total cost. The current study's per-hectare total cost of tobacco production was found Tk 175601.89 (Table 4.9).

4.2.2.6.Gross Return

Gross return was calculated on the multiplication of yield per hectare and price of per tobacco. The yield of tobacco per hectare was Tk 2773.30 kg and the average price of tobacco was Tk 69.87 per kg.The average price of main product (Tobacco) was Tk 193770.47 per hectare and the average price of by product was Tk 15509.23 per hectare.Therefore, the gross return was found to be Tk 209279.70 per hectare.(Table 4.10)

Table 4.10. Per Hectare Gross Return of Tobacco Cultivation

Items	**Quantity (kg/ha)**	**Price per kg**	**Return (Tk/ha)**
Tobacco	2773.30	69.87	193770.47
By Products	443.121	35.00	15509.23
Gross return			209279.70

Source: Field Survey, 2022

4.2.2.7.Gross Margin

To calculate the gross margin, the whole variable cost was deducted from the gross return.. The statistics indicated that the gross margin per hectare was Tk 86340.62 (Table 4.10).

4.2.2.8.Net Return

To get the net return, the entire cost of production was deducted from the gross return or profit. The net return per hectare was projected to be Tk 33677.81 based on the data (Table 4.11).

4.2.2.9.Benefit Cost Ratio (Undiscounted)

The benefit per unit of cost may be compared using the benefit cost ratio, or BCR. The results showed that the Benefit Cost Ratio (BCR) was 1.19, meaning that a taka investment in tobacco production produced Tk 1.19 (Table 4.11). It was determined by the computation above that tobacco farming is lucrative in the research area.

Table 4.11. Per Hectare Cost and Return of Tobacco

Items	**Cost /Return (Tk/ha)**
A. Total variable cost	122939.08
B. Total fixed cost	52662.81
C. Total cost	175601.89
D. Gross return	209279.70
E. Gross margin (D-A)	86340.62
F. Net return (D-C)	33677.81
G. **Undiscounted BCR (D /C)**	1.19

Source: Field Survey, 2022

The price of the product, yield, and input costs all affect how profitable a crop may be grown. The place, time, and degree of administration have all changed. The explanation above leads one to the conclusion that tobacco farming is lucrative.

4.3. Functional Analysis for Measuring Production Efficiency

A production function is a mathematical function that indicates the highest output that, at a certain degree of technology, can be produced with a particular set of inputs. Since it is nearly hard to specify and measure a management element, especially in the context of the current study, it was excluded from the model.Based on some initial estimation, other independent factors that would have had an impact on the output of farming companies, such as time, soil quality, and water quality, were removed from the model.Table 4.12 displays the calculated coefficients and associated statistics of the Cobb-Douglas production function for tobacco production.

4.3.1.Interpretation of the Production Function

4.3.1.1.Cost of Hired Labor (X_1)

The hired labor cost of regression coefficient for tobacco production was positive (0.22) and significant at 10% level of significance. This meant that, assuming all other variables remained constant, an increase of 1% in the hired labor cost would result in an increased of 0.220% in tobacco yield. (Table 4.12).

4.3.1.2.Cost of Seedling (X_2)

The seedling cost regression coefficient was insignificant. (Table 4.12).

Table 4.12. Estimated Co-efficient and Their Related Statistics of Production Function of Tobacco Cultivation.

Variables	Parameter	Coefficients	Std. Error	T-ratio
Constant	β_0	4.277***	0.55	7.81
Hired Labour (X_1)	β_1	0.220*	0.12	1.84
Seedling (X_2)	β_2	0.128	0.09	1.34
Urea (X_3)	β_3	0.151***	0.05	3.09
TSP (X_4)	β_4	0.159	0.13	1.25
MoP (X_5)	β_5	0.304***	0.11	2.83
Compost (X_6)	β_6	-0.046	0.09	-0.54
Insecticide (X_7)	β_7	-0.106	0.11	-0.93
Irrigation (X_8)	β_8	0.014	0.04	0.30
R^2	0.8678			
Adjusted R^2	0.8474			

Note: ***, ** and * indicate 1%, 5% and 10% level of significance respectively
Source: **Field Survey, 2022**

4.3.1.3.Cost of Urea (X_3)

The regression coefficient for the urea cost of tobacco production was positive (0.15) and significant at 1% level of significance. This meant that, assuming all other parameters remained constant, at 1% increase in urea expenditure would result in a 0.151% increased in tobacco output. (Table 4.12).

4.3.1.4.Cost of TSP (X_4)

The regression coefficient of TSP cost was insignificant. (Table 4.12).

4.3.1.5.Cost of MOP (X_5)

When all other parameters were held constant, the MOP cost of the regression coefficient of tobacco production was positive (0.30) and significant at 1% level of significance. This meant that if the amount spent on MOP was raised by 1%, the yield of tobacco would increase by 0.30%. (Table 4.12).

4.3.1.6.Cost of Compost (X_6)

The Compost of regression coefficient was insignificant. (Table 4.12).

4.3.1.7.Cost of Insecticide (X_7)

The Insecticide cost of regression coefficient was insignificant. (Table 4.12).

4.3.1.8.Cost of Irrigation (X_8)

The Irrigation cost of regression coefficient was insignificant. (Table 4.12).

4.3.1.9.Coefficient of Multiple Determinations (R^2)

The coefficient of multiple determination for tobacco farming was determined to be 0.8678, meaning that the explanatory variables included in the model could account for about 86.78% of the variation in the gross return. Thus, since R^2shows the regression model's goodness of fit, we may conclude that it has a greater goodness of fit (Table 4.12).

4.3.1.10.Adjusted R^2

The adjusted R^2 for tobacco cultivation was determined to be 0.8474, meaning that the explanatory variables included in the model explained approximately 84.74% of the variability in the output (Table 4.12).

4.4. Findings of the Resource Use Efficiency of Cultivation

In order to identify the status of resource use efficiency, it was considered that a ratio equal to unity indicated the optimum use of that factor.A ratio more than unity indicated that the yield could be increased by using more of the resources.A ratio less than unity indicated the unprofitable level of resource use,which should be decreased to miminize the losses because farmers over used this variable.The negative value of MVP indicates the indiscriminate and inefficient use of resource.The ratio of MVP to MFC of hired labor (1.06) for tobacco cultivation was positive and more than one, indicating that the research region had underutilized (Table 4.12).So in order to achieve significant efficiency farmers should increase the use of total hired labor.

Table 4.12 shows that the ratio of MVP and MFC of seedling(1.86) for tobacco cultivation. was positive and more than one, indicating that the research region had underutilized (Table 4.12). Therefore, growers need use more seedling in order to achieve a notable increase in efficiency.

Table. 4.13. Resource Use Efficiency of Tobacco Cultivation

Variable	GM	Y/Xi	Co-efficient	MVP	MFC	R=MVP/ MFC	Comment
Return (Y)	184956.80						
Hired Labor Cost (X_1)	38397.73	4.82	0.22	1.06	1	1.06	Underutilized
Seed or Seedling Cost (X_2)	12683.91	14.58	0.13	1.86	1	1.86	Underutilized
Urea Cost (X_3)	6183.19	29.91	0.15	4.51	1	4.51	Underutilized
TSP Cost (X_4)	8501.90	21.75	0.16	3.47	1	3.47	Underutilized
MOP Cost (X5)	2560.97	72.22	0.30	21.96	1	21.96	Underutilized
Compost Cost (X6)	7842.25	23.58	-0.05	-1.08	1	-1.08	Overutilized
Insecticides Cost (X7)	1370.66	134.94	-0.11	-14.27	1	-14.27	Overutilized
Irrigation Cost (X8)	7490.82	24.69	0.014	0.34	1	0.34	Overutilized

Source: Field Survey, 2022

Table 4.13 shows that the ratio of MVP and MFC of Urea (4.51) for tobacco cultivation was positive and more than one, indicating that the research region had underutilized (Table 4.13). So farmers should increase the use of urea to attain efficiency considerably.

The ratio of MVP and MFC of TSP (3.47) for tobacco cultivation was positive and more than one, indicating that the research region had underutilized (Table 4.13). (Table 4.13). Hence, in order to achieve notable efficiency, farmers need apply TSP more often.(Table 4.13).

Table 4.13 shows that the ratio of MVP to MFC of MOP (21.96) for tobacco cultivation was positive and more than one, indicating that there was insufficient utilization of seed for tobacco production in the research region. So Farmers should employ MOP more frequently to get significant efficiency gains.

The ratio of MVP to MFC of compost (-1.08) for tobacco cultivation was negative and more than one, indicating that the research region had overutilized (Table 4.13).So farmers should decrease the use of compost to attain efficiency considerably.

The ratio of MVP to MFC of the pesticide (-14.27) for tobacco production, which was negative and less than one, indicating that the research region had overutilized (Table 4.13). So farmers should decrease the use of pesticide to attain efficiency considerably.

The ratio of MVP to MFC of irrigation (0.34), which was positive and less than one,which indicating that the research area had overutilized(Table 4.13).So farmers should increase the use of irrigation to attain efficiency considerably.

So, the use of hired labor, seed, urea, TSP and MOP have not been fully utilized by the tobacco farmers.

CHAPTER 5

CONSTRAINTS OF TOBACCO FARMERS

5.1. Problems of Tobacco Cultivation

Table 5.1. Problems of Tobacco Cultivation Faced by Farmers

Problems	Frequency	Percentage	Rank
High Price of Quality Seed	51	83.61	1st
Low Price of Output	48	78.68	2nd
Lack of Capital	40	65.57	3rd
High Price of Fertilizer	35	57.38	4th
Lack of Quality Seed	27	44.26	5th
Inadequate Extension Service	18	29.51	6th
Lack of Tobacco Storage Facility	15	24.59	7th
Natural Calamities	9	14.75	8th

Source: **Field Survey, 2022**

5.1.1. High Price of Quality Seed

According to Table 14, 83.61% of farmers considered the high cost of good-quality seed to be a significant issue. Most farmers who rank it first consider this as one of their most critical financial issues.

5.1.2. Low Price of Output

The price of tobacco stayed low during harvest, thus they were unable to receive a reasonable price for their goods. About 78.68% of farmers reported this problem and ranked in 2nd in the study area.

5.1.3. Lack of Capital

In the research area, about 65.57% of farmers reported not having enough cash on hand for operations. Lack of capital is the third most important concern out of all of them.

5.1.4. High Price of Fertilizer

About 57.38 % tobacco growers complained about the high price of fertilizer. Though government gave subsidy on fertilizer, they were unable to buy sufficient fertilizer because of financial issue.

5.1.5. Lack of Quality Seed

Approximately 44.26% of Tobacco growers in the study area reported this as a major problem which ranked in 5th in the study area.

5.1.6. Inadequate Extension Service

About 29.51 % of farmers, the complaint was that they were not given the tobacco-growing guidelines created by the appropriate Department of Agricultural Extension (DAE) personnel.The research area suffers from inadequate training.

5.1.7. Lack of Tobacco Storage Facility

About 24.59% tobacco farmers stated that they faced lack of tobacco storage facilities during harvesting period and froe this reason they had suffered with certain losses.

5.1.8. Natural Calamities

About 14.75% of cultivars had some serious nature-related issues during the cultivation process.

CHAPTER 6

SUMMARY, CONCLUSION AND RECOMMENDATIONS

6.1. Summary

The largest generating sector of the economy, agriculture adds over 11.50% (FY 2021–2022) to the nation's GDP gross domestic product. The development of this sector is intrinsically related to the growth of the economy. Tobacco is a single-cropped plant that typically grows from the middle of October to the middle of March. In Bangladesh, tobacco production is Bangladesh was the 59th largest exporter of processed tobacco in the world in 2020 with $3.69 million worth of exports.Now-a-days, commercial tobacco cultivation is a issue of debate and so need research on it.

This study seeks to assess the present sociodemographic status of tobacco farmers, and to explore the profitability of tobacco production, to investigate the resource use efficiency of tobacco production, and to identify the constraints faced by tobacco farmers. 61 Tobacco producers were chosen at random sampling from the study area during the months of November and December of 2022. The survey was undertaken in Lalmonirhat sadar, and Kaliganj upazillas in Lalmonirhat district. Then the data collection process was finished, the raw data was imported into STATA for analysis and input into the computer using an MS Excel spreadsheet.

Descriptive analysis was used to evaluate demographic status of tobacco farmers and to measure the profitability of tobacco production. Cobb-Douglas Production Function Model was used to evaluate the Tobacco production.

The largest group of Tobacco Farmers (34.40 %) is between the ages of 40-50 years,and 50- 60 years,18% of the respondents were followed by the ages of 30-40 years,9.8% of the respondents were between the ages of 18-30 years and 3.4% of the ages above 60 years. According to the education status, the majority of the farmers were secondary level (32.8%) while the percentages of illiterate, primary level, higher secondary level and higher education level were 24.6%, 19.7%, 13.1% and 9.8%. About 48% farmers were engaged in crop farming and 5% were involved in day labour and service as a support function followed by 3% business. In case of farm size of tobacco farmers, 81.97% farmers were small category, 14.75% farmers were marginal and 3.28% were in medium category. There was no sample farmer in landless and large category. Among total 61 tobacco farmers, 55.7% farmers were engaged in organization through membership while remaining (44.3%) were not involved in organization. In case of

distance from market, the highest proportion 68.8% of the farmers had long distance while 23% of the farmers have medium distance and 8.2% of the farmers had short distance from market.

The financial profitability of tobacco cultivation is largely determined by the cost of hired labor, machinery inputs, land preparation, weeding, seed, urea, tsp, mop, zinc, and irrigation. Human labor cost was Tk 44000 per hectare which 25.06% of total cost. Machinery inputs were Tk 2718.41per hectare representing 1.55% of total cost. Land preparation cost was Tk 15624.47 per hectare that 8.90% of the total cost. Weeding cost was Tk 4947.82 per hectare, which constituted 2.82% of the total cost. Urea cost was calculated to be Tk 7042.06, that formed 4.01% of total cost. TSP cost was calculated to be Tk 9621.76, that formed 5.48% of total cost. MOP cost was estimated to be Tk 3062.51, which constituted 1.74% of total cost. Zinc cost was Tk 684.67 per hectare, the average cost of irrigation water was found to be Tk. 10136.98 per hectare, that 5.77% of the total cost. The cost of insecticides was found to be Tk 1509.30 per hectare, that 0.86% of the total cost. The total variable cost of tobacco production was Tk 122939.08 per hectare, representing 70.01% of the total cost. The interest on operating capitals were estimated at Tk 4819.30 per hectare, representing 2.74% of the total cost. The rental value of land was calculated Tk 21843.5 per hectare which was12.44% of the total cost. Average family labour cost was Tk 26000 representing 14.81% of the total cost. The total fixed cost was Tk 52662.81 per hectare ,representing 29.99% of the total cost. The total cost was Tk 1756501.89 per hectare. The average yield of tobacco per hectare was 2773.30 kg and the average price per kg was Tk 69.87. The average price of main product was Tk. 193770.47 per hectare and the average price of by product was Tk 15509.23 per hectare, resulting in a gross return of Tk 209279.70 per hectare. Gross margin was found to be Tk 86340.62 per hectare. Net return or profit was estimated as Tk 33677.81 per hectare. Benefit Cost Ratio (Undiscounted) was found to be 1.19 which implies that one taka investment in tobacco production generated Tk 1.19. The computation above revealed that tobacco farming is profitable in the research area.

In this study, Cobb-Douglas production function model to determine the effect of variables on tobacco cultivation. The regression coefficient of the cost of hired labor (X_1) of tobacco production was positive (0.22) and significant at 10% level of significance. The cost of Urea (X_3) was positive (0.15) and significant at 1% level of

significance. The cost of MOP (X_5) was positive (0.30) and significant at 1% level of significance. The cost of seed (X_2) cost of TSP (X_4) cost of insecticide (X_6) cost of irrigation (X_7) were not significant. Resource use efficiency indicated that use of hired labor, seed, Urea, TSP and MOP were underutilized and use of compost, irrigation and insecticide were overutilized by tobacco farmers. The Tobacco growers faced a lot of problems to grow tobacco. High price of seed was problems of cultivating tobacco in the study area. Low price of output, lack of capital, fertilizers high price, lack of quality seed, inadequate extension service, lack of tobacco storage facility, natural calamities and the main issue the producers encountered was a lack of training.

6.2. Conclusion

Tobacco is one of the important narcotic crops grown by farmers maily for market purpose.The study areas have tremendous potential for tobacco cultivation.The findings of the study indicate that tobacco cultivation is profitable and could help improve the socio-economic status of sample farmers in the study areas.Due to land constrains in Bangladesh it is difficult to expand tobacco cultivation by increasing the area under cultivation.Farmers fail to function properly due to capital ,limited experience,illiteracy etc.Therefore, well-organized management training in line with their problems,needs,objectives and resource base leads to effective production practices.

6.3. Recommendations

After studying the mentioned area assertion problems were found and the following recommendation could be made according to farmers opinion:

i) As tobacco is a profitable crops,government and concern instituitions should provide adequate extension programme to expand their area and production.

ii) Tobacco growers should receive sufficient instruction and adequate training on prescribed fertilizer doses, pesticides, seed application, irrigation application, intercultural operations, etc., since this will increase productivity.

iii) By assuring government regulation the output price should be increased in a reasonable way.

6.4 Limitation

a) Though tobacco cultivation is grown throughout the country including greatest growing regions Rangpur, Lalmonirhat, Kushtia, Chattogram and Gazipur, the study was restricted to only three upazillas of Lalmonirhat district where Tobacco production was intense. Two upazillas under that district were selected purposively. The study might be momentous outcome if it enclosed a number of districts producing Tobacco.

b) Due to deficiency of time and money, the study could not cover wide side areas for gathering obligatory information.

c) Some written records were asserted by the literate respondents, but maximum respondents had no written document. Therefore, the researcher had to depend solely on the memory of the respondents.

d) A study that brings in interview of 61 farmers cannot conclude anything accurately .

REFERENCES

Akhter, F., Rafiqul, H., & Mujahidul, I. P. (2011). Tobacco cultivation and its impact on food production in Bangladesh. *Unnayan Bikalper Nitinirdharoni Gobeshona (UBINIG), Dhaka, Bangladesh*.

Ali, M. Y., Islam, M. F., Rahman, M. R., Sheema, M. K., & Akhtar, M. R. (2015). Tobacco farming in Bangladesh and its impact on environment. *IOSR Journal of Environmental Science, Toxicology and Food Technology*, *9*(12), 27-33.

Bangladesh Bureau of Statistics (2022). "Yearbook of Agricultural Statistics of Bangladesh 2021," Ministry of Planning, Dhaka, Bangladesh.

BER (2021). Bangladesh Economic Review, Department of Finance, Ministry of Finance, Government of the People's Republic of Bangladesh, Dhaka.

BER (2021). Bangladesh Economic Review, Department of Finance, Ministry of Finance, Government of the People's Republic of Bangladesh, Dhaka.

Barkat, A., Chowdhury, A. U., Nargis, N., Rahman, M., Khan, M. S., Kumar, A., ... & Chaloupka.

BBS (2022),Yearbook of Agricultural Statistics 2022.Bangladesh bureau of Statistics,Ministry of planning, Government of the People's Republic of Bangladesh, Dhaka.

Chirwa, E. W. (2009). Farmer organisations and profitability in smallholder tobacco in Malawi.

DAE (2022). Tobacco Producation Report, June 2022. Department of Agaricultural Extension, Government of the People's Repulice of Bangladesh,Dhaka.

F. J. (2012). The economics of tobacco and tobacco taxation in Bangladesh. *Paris: International Union Against Tuberculosis and Lung Disease*.

Faisal, M., Chunping, X., Akhtar, S., Raza, M. H., Nazir, A., Mushtaq, Z., & Ajmal, M. A. (2018). Economic Analysis and Production Efficiency of Dark Sun Cured Rustica Tobacco Production A Case Study of Punjab. *Pakistan, Journal of Social Sciences and Humanity Studies*, *4*(4), 7-14.

Gumus, G. (2008). Economic analysis of oriental tobacco in Turkey. *Bulgarian journal of agricultural science*, *14*(2008), 470-475.

Hassan, M. M., Parvin, M. M., & Resmi, S. I. (2015). Farmer's profitability of tobacco cultivation at Rangpur district in the socio-economic context of Bangladesh: anempirical analysis. *International Journal of Economics, Finance and Management Sciences*, *3*(2), 91-98.

HIES(2020).Reports on Household Income and Expenditure survey,Ministry of Planning , Dhaka,Bangladesh.

Hossain, M. M., & Rahman, M. M. (2013). A socioeconomic analysis on tobacco cultivation in Kushtia District of Bangladesh. *Social Sciences*, *2*(3), 128-134.

Hussain, A. G., Rouf, A. S. S., Shimul, S. N., Nargis, N., Kessaram, T. M., Huq, S. M., ... & Drope, J. (2020). The economic cost of tobacco farming in Bangladesh. *International Journal of Environmental Research and Public Health*, *17*(24), 9447.

https//en.banglapedia.org/index. php/lalmonirhat.district.

Keyser, J. C. (2002). *The costs and profitability of tobacco compared to other crops in Zimbabwe*. World Bank, Washington, DC.

Motaleb, M. A., & Irfanullah, H. M. (2011). Tobacco cultivation in Bangladesh: is it a threat to traditional agro-practice?.

Nasrullah, M., Chang, L., Saddozai, K. N., Khalid, A. O., & Bayisenge, R. (2019). G hameed. 2019. Cost and net return of tobacco growers–a case study of district Mardan (KP-Pakistan). *Sarhad Journal of Agriculture*, *35*(2), 565-571.

Ntibiyoboka, J. (2014). *Economics of smallholder tobacco production and marketing in Mpanda District* (Doctoral dissertation, Sokoine University of agriculture).

Ören, M. N., & Alemdar, T. (2006). Technical efficiency analysis of tobacco farming in Southeastern Anatolia. *Turkish Journal of Agriculture and Forestry*, *30*(2), 165-172.

Saddozai, K. N., Nasrullah, M., & Khan, N. P. (2015). Stochastic frontier production analysis of tobacco growers in district Mardan, Pakistan. *Pakistan Journal of Agricultural Research*, *28*(4).

Sarkar and Haque, (2001), Tobacco Agricultural Research in Bangladesh in the 20th Century, Bangladesh Agricultural Research Council, Dhaka, Bangladesh.

The Observatory of Economic Complexity, "Report on Processed Tobacco in Bangladesh 2020,".

Ullah, S., Shah, M., Ullah, K., Ullah, R., & Ali, M. (2015). Economic analysis of tobacco profitability in district Swabi. *Economic Analysis*, *10*, 75-79.

APPENDIX

Profitability And Resource Use Efficieny of Tobacco Cultivation in some selected Areas of Lalmonirhat District in Bangladesh

Serial number: ☐ **Date:**

Dear Respondent,
All of your information will be kept confidential and will be used for research purpose only. Please provide the following information.

A. General information

Name:....…….....

Village:…….……..……..……..…Upazila:……..……..

District: ……..….. Mobile: ……..……

B. Socio-economic information

1. Household Information

Name of Household Member	Relation with Respondent	Age (Years)	Years of Schooling	Sex (M/F)	Sources of income		Yearly Income (Tk)	
					Main	Subsidiaries	Main	Subsidiaries
Respondent	Self							

(Use code: Crop Farming= 1, Livestock Rearing=2, Fish Farming=3, Day labour=4, Service=5, Business =6, Remittances=7, Others=8)

2. Area under tobacco cultivation and land ownership

Owner cultivation of tobacco (decimal)	Tenant cultivation of tobacco (decimal)

3. Farm Size

Types of Land	Area (decimal)
Homestead land	
Own cultivable land	
Mortgaged in land	
Mortgaged out land	
Rented in land	
Rented out land	
Leased in Land	
Leased out land	
Pond	
Fallow	
Total	

C. Productivity related information

4. Cost of production

(a) Human labour use

Activities	Types of labour	Man-days	Wage rate (Tk./day)	Total value(Tk)
1.Land Preparation	Family			
	Hired			
2.Seed Sowing	Family			
	Hired			
3. Weeding	a. Family			
	b. Hired			
4. Irrigation	a. Family			
	b. Hired			

5. Applying fertilizer	a. Family			
	b. Hired			
6. Applying insecticide or others	a. Family			
	b. Hired			
7. Harvesting	a. Family			
	b. Hired			
8. Threshing	a. Family			
	b. Hired			
9. Drying and storing	a. Family			
	b. Hired			

(b) Machinery Inputs

Purpose of use	Types of ownership	Unit	Cost/unit	Total Cost (Tk.)
1. Land preparation (Power tiller / Tractor)	a. Owned			
	b. Hired			
2. Harvesting (Corn harvester)	a. Owned			
	b. Hired			
3.Carrying (Tractor / Power tiller / Van)	a. Owned			
	b. Hired			
4.Threshing (Thresher)	a. Owned			
	b. Hired			
5. Others (specify)	a. Owned			
	b. Hired			

(c) Materials Inputs

Inputs (unit)	Types	Quantity	Unit	Price/unit	Total Value (Tk.)
1. Seed (Kg)	a. Home supplied				
	b. Purchased				
2. Manure(Sack)	a. Home supplied				
	b. Purchased				
3. Fertilizer (Kg)	Urea				
	TSP				
	MoP				
	Potassium				
	Nitrogen				
	Calcium				
4. Irrigation					
5. Insecticide (Liter)					
6. Others (Specify)					

5. Return from Tobacco cultivation

Output(s)	Quantity (Kg)	Price (TK/Kg)	Total income (Tk)
Product(kg)			
By-product/cancel			

Weather events adversely affected the household or the farming

Natural calamities	Event Code	The last 5 years if it happened, estimate of the amount of loss to the household (taka)
Floods		
Drought		
Frequent Rainfall		
Soil / River Erosion		
Cyclone		
Salinity Increase		

7 .Please mention the problems in Tobacco cultivation

I. High price of quality seed

II. Lack of quality seed

III. Low price of grains

IV. High price of fertilizer

V. Lack of irrigation facilities

VI. Natural calamities

VII. Lack of suitable land

VIII. Inadequate extension service

IX. Lack of training

X. Lack of marketing

XI. Lack of capital

XII. Lack of government support

XIII. Lack of technical knowledge

XIV. Lack of Tobacco storage facility